CLAIMS

1. A film scanner for converting between images on film and electrical signals, comprising:

- a light source for scanning film;

- collection optics arranged to image light transmitted by the film through an imaged-light path;

- one or more image light sensors arranged to receive the light from the collection optics through the imaged-light path and to produce one or more image signals representative of an image on the film;

- a reflector arrangement defining an internally reflective cavity and having at least one entrance aperture for receiving light transmitted by the film and one exit aperture for passing light to the one or more image light detectors and arranged to surround at least a portion of the imaged-light path;

- a scattered light sensor arranged in relation to the reflector arrangement to receive light which has been transmitted through the film but scattered by the film from the imaged-light path and reflected within the internally reflective cavity to produce a scattered light signal representative of the scattered light; and

- processing circuitry configured to receive the one or more image signals and the scattered

light signal and having functionality to compensate the one or more image signals with reference to the scattered light signal.

2. A film scanner according to claim 1, wherein the reflector arrangement comprises an integrating sphere.

3. A film scanner according to claim 1 or 2, wherein the reflector arrangement includes a light collection lens system.

4. A film scanner according to claim 3, wherein the light collection lens system comprises a first lens near the entrance aperture.

5. A film scanner according to claim 3 or 4, wherein the light collection lens system comprises a second lens after the exit aperture.

6. A film scanner according to claim 3, 4 or 5, further comprising a scanning lens for imaging the light source onto film, wherein the light collection lens system comprises a first lens near the entrance aperture and wherein the exit aperture is circular and has a diameter substantially equal to the diameter of the image of the scanning lens formed by the first lens.

7. A film scanner according to any preceding claim, wherein the scattered light detector is arranged to receive scattered light through a further exit aperture of the reflector arrangement.

8. A film scanner according to claim 7, wherein the further exit aperture is at one side of the cavity.

9. A film scanner according to any preceding claim, wherein the processing circuitry includes a summing unit for summing a function of the scattered light signal with each of the one or more image signals.

10. A film scanner according to any preceding claim, wherein the one or more image signals are three image signals each representing respectively red, green and blue light, and wherein the collection optics are arranged to image light onto respective red, green and blue image light sensors via colour splitting optics.

11. A film scanner according to claim 10, wherein the function of the scattered light signal includes the scattered light signal and the red, green and blue image signals.

12. A film scanner according to claim 10 or 11, wherein the function is:

(Scratch signal x k x colour)/(a x red + b x green + c x blue)

where: "scratch signal" is the scattered light signal
"k" is a variable constant
"Colour" is the relevant colour image signal
"Red, green, blue" are the colour image signals
"a,b,c" are constants.

13. A film scanner according to claim 9,10, or 12, wherein the processing circuitry includes a correction unit for correcting the scattered light signal for variations in the brightness of the light source.

14. A film scanner according to claim 13, further comprising three reference sensors, one each for red, green and blue light for producing signals representative of variations in the brightness of the light source, and wherein the correction unit produces a function of the signals received each of red, green and blue reference sensors.

15. A film scanner according to claim 14, wherein the function is a sum of the red, green and blue reference signals in variable proportions.

16. A film scanner according to any preceding claim, wherein the the reflector arrangement is arranged between the film and subsequent light splitting and collection optics.

17. A light collection system for a film scanner in which film is scanned with a light source and light transmitted by the film is imaged through an imaged-light path onto one or more image light detectors for producing one or more image signals representative of an image on film, comprising:

- a reflector arrangement having an internally reflective cavity and at least one entrance aperture for receiving light transmitted by the film and one exit aperture for passing light to the one or more image light detectors;

- a scattered light detector for detecting light which has been transmitted through the film but scattered by the film from the imaged-light path and reflected within the internally reflective cavity to produce a scattered light

signal representative of the scattered light; and

- processing circuitry configured to receive the one or more image signals and the scattered light signal and having functionality to compensate the one or more image signals with reference to the scattered light signal.

18. A light collection system according to claim 17, wherein the reflector arrangement comprises an integrating sphere.

19. A light collection system according to claim 17 or 18, wherein the reflector arrangement includes a light collection lens system.

20. A light collection system according to claim 19, wherein the light collection lens system comprises a first lens near the entrance aperture.

21. A light collection system according to claim 19 or 20, wherein the light collection lens system comprises a second lens after the exit aperture.

22. A light collection system according to claim 19, 20 or 21, in which the film scanner has a scanning lens for imaging the light source onto film, wherein the light collection lens system comprises a first lens near the entrance aperture and wherein the exit aperture is circular and has a diameter substantially equal to the diameter of the image of the scanning lens formed by the first lens.

23. A light collection system according to claim 17 to 22, wherein the scattered light detector is arranged to receive scattered light through a further exit aperture of the reflector arrangement.

24. A light collection system according to claim 23, wherein the further exit aperture is at one side of the cavity.

25. A light collection system according to claims 17 to 24, wherein the processing circuitry includes a summing unit for summing a function of the scattered light signal with each of the one or more image signals.

26. A light collection system according to any of claims 16 to 24, wherein the one or more image signals are three image signals each representing red, green and blue light, and wherein the collection optics are arranged to image light onto respective red, green and blue image light sensors via colour splitting optics.

27. A light collection system according to claim 26, wherein the function of the scattered light signal includes the scattered light signal and one or more of the red, green and blue image signals.

28. A light collection system according to claim 27, wherein the function is:

(Scratch signal x k x colour)/(a x red + b x green + c x blue)

where: "scratch signal" is the scattered light signal
"k" is a variable constant
"Colour" is the relevant colour image signal

"Red, green, blue" are the colour image signals
"a,b,c" are constants.

29. A light collection system according to claim 26, 27 or 28, wherein the processing circuitry includes a correction unit for correcting the scattered light signal for variations in the brightness of the light source.

30. A light collection system according to claim 29, further comprising three reference sensors, one each for red, green and blue light for producing signals representative of variations in the brightness of the light source, and wherein the correction unit produces a function of the signals received each of red, green and blue reference sensors.

31. A light collection system according to claim 30, wherein the function is a sum of the red, green and blue reference signals in variable proportions.

32. A telecine comprising a film scanner according to any of claims 1 to 16.

33. A light collection system or film scanner substantially as herein described with reference to Figures 2, 4 and 5.